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THE VETERINARY JOURNAL

A Monthly Review of Veterinary Science.

Editor:

FREDERICK HOBDAY, C.M.G., F.R.C.V.S., F.R.S.E.,
HONORARY VETERINARY SURGEON TO HIS MAJESTY THE KING,
OFFICIER DU MÉRITE AGRICOLE (FRANCE),
CAVALIERE DEI SS. MAURIZIO E LAZZARO (ITALY),
HONORARY MEMBER OF THE AMERICAN VETERINARY ASSOCIATION,
AND FORMERLY PROFESSOR IN THE ROYAL VETERINARY COLLEGE, LONDON.

Sub-Editor:
GLADSTONE MAYALL, M.R.C.V.S.

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Sub-Editor:
GLADSTONE MAYALL, M.R.C.V.S.

DECEMBER, 1924.

Editorial

IMMUNISATION AGAINST TUBERCULOSIS.

In our last issue we drew attention to an article by Dr. Nathan Raw on the vaccination of calves against tuberculosis, and from articles which have appeared since in contemporary journals, it is evident that the matter is creating a good deal of attention.

In this month's Journal we publish a clinical note by Mr. Arthur Payne, F.R.C.V.S., in which he demonstrates the great value which this vaccine has been as an adjunct to the use of tuberculin, not only in clearing out tuberculosis from a valuable pedigree herd, but in preventing its re-introduction through the contact infection of the young stock born on the premises. To our knowledge, a number of practitioners are now using Dr. Raw's immunising vaccine, and we are hoping from time to time to publish their results. Should it prove successful, there is a reasonable hope (taking the average life of a dairy cow at about ten years) that by the universal use of a vaccine which will immunise the newly born calves, it will be possible to stamp out this scourge within a reasonable time. Another great advantage which a system of this kind has, is that it is a comparatively inexpensive process, as the only cost attached to it is that which is necessitated by the two visits of the veterinary practitioner and the small cost of two doses per calf of the vaccine.

A further proof of the professional interest which Dr. Nathan Raw's article has excited is shown in our correspondence column by the letter of Professor Gaiger, who draws attention to the articles by Calmette, Guérin, and Vallée, our French colleagues, who state that it is necessary to immunise annually to keep the animals free from

natural infection. Even with this additional cost and trouble, if further trials prove that it is a satisfactory preventative, and Government control can be induced to make such a course compulsory, it seems as if we are on the threshold at last of a means whereby tuberculosis can be stamped out from our cattle within a maximum period of two decades.

Before leaving the subject of tuberculosis, we would also draw the attention of our readers to the various articles on this disease which are appearing in this month's number, particularly abstracts on the method which is being adopted at the present time in Saskatchewan, Canada (and also in parts of the United States); that on the "Eradication of Bovine Tuberculosis," by Mr. P. F. Dolan, the Chief Veterinary Inspector to the Corporation of Dublin; the abstract from the Annual Report of Lieut.-Colonel T. Dunlop Young, Chief Veterinary Inspector for the City of London; and the brief extracts on the "Susceptibility of Swine to Avian Tubercle Infection," and Dr. Friedmann's "Anti-Tuberculous Vaccination Process."

General Articles

A PRELIMINARY NOTE ON DR. NATHAN RAW'S IMMUNISING VACCINE AGAINST TUBERCULOSIS.

By ARTHUR PAYNE, F.R.C.V.S.,
Weybridge.

I AM now able to give a few preliminary notes on the results following the hypodermic injection of Tubercle Immunising Vaccine R into calves born on a farm where I first tested the cows in November 1921 and obtained 50 per cent. of reactors. The owner of the herd was so impressed by the results of the first test that he instructed me to test the cows every six months, as he was determined to have a tubercle-free herd. I might mention that two of the animals in the first test gave temperatures of 107°, and three of over 106°. The reactors were isolated and by degrees disposed of.

In April	1923	we still had	15	per cent.	reactors.
In October	1923	,,	10	,,	,,
In April	1924	,,	5	,,	,,
In October	1924	we had	nil		,,

I first used the Tubercle Immunising Vaccine R in February 1923, and thereafter every calf born on the farm received a dose a week after birth and a second dose two weeks later. Following are details relating to twenty-seven calves born on the farm since February 1923. They were tested (hypodermic and ophthalmic) with material

obtained from the R.V.C., and temperatures were taken three hours before injection, at injection, and at ninth, twelfth, and fifteenth hours after injection. The test in October 1924 gave negative results in every case (eighty animals).

The twenty-seven animals are :—

Hilda	born 6– 2–23	Tested October 1923, April 1924, October 1924.
Emblem	born 3– 3–23	
Query	born 9– 5–23	
Louie	born 13– 5–23	
Dona Lass	born 15– 5–23	
Beauty's Cyrene	born 7– 6–23 (see notes)	
Nadejda	born 24– 6–23	
Queen Eleanor	born 17– 8–23	
Hettie	born 21–10–23	Tested April and October 1924.
Flower 4th	born 20– 1–24	Tested October 1924
Governess	born 21– 1–24	
Bissette	born 10– 2–24	
Obed	born 18– 3–24	
Fern	born 20– 3–24	
Gracey 2nd	born 25– 3–24	
Barbara	born 31– 3–24	
Emblem's Governor	born 1– 4–24 (see notes)	
Margaret's Lad	born 3– 4–24	
Cora	born 12– 5–24	
Pamela	born 16– 5–24	
Maddy 2nd	born 17– 5–24	
Girlie	born 25– 5–24	
Celia	born 25– 5–24	
Carriere's Governor	born 7– 6–24 (see notes)	
Dona Lass 2nd	born 19– 6–24	
Roberto 2nd	born 22– 6–24	
Vallon Butt	born 10– 7–24	

Beauty's Cyrene was born an ill-nourished calf, and at two months of age suffered for a time with " scour." Was destroyed at six months for an injury to stifle. Not tested October 24th. Post-mortem revealed presence of parasitic bronchitis. No lesions of tuberculosis.

Emblem's Governor and Carriere's Governor. These calves suffered from recurrent " scour " during the five months of their lives, were " bad doers," and very unthrifty in appearance. They were destroyed after testing. No post-mortem lesions of tuberculosis.

It will be observed that a fairly high percentage of reactors occurred prior to April 1924. The vaccine was first used February 1923. Infection must have taken place in the cowsheds, as no animal was allowed to enter the herd before satisfactorily passing the tubercular test. The inference is that those animals treated with the vaccine were able to resist the invasion of their bodies by the tubercle bacillus.

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ERADICATION OF BOVINE TUBERCULOSIS.

By P. F. DOLAN, M.R.C.V.S., D.V.S.M.,
Chief Veterinary Inspector to the Corporation of Dublin, Irish Free State.

THE more that is written, the more discussion that takes place, the more prominence that is given to the subject of bovine tuberculosis, the nearer we will get to a serious effort being made towards its eradication.

There are some who advise the immediate slaughter of all affected milch cows, but these hardly recognise the immensity of the problem. There are others who on account of the immensity of the problem put it in the background.

Most of those who have taken a deep interest in the subject and who have studied it in all its aspects will agree that the disease can be eradicated in time by the wise expenditure of money and hard work. The percentage of affected animals in a country can be lowered year by year, and finally the complete eradication can be successfully tackled. The finance of a country or the amount of money that public opinion can force to be spent on this problem will play a most important rôle in deciding the number of years in which the disease will become extinct.

The eradication must be gradual. A certain amount of serious work should be done each year, so that after a number of years the problem would become much smaller, and finally eradication would be completed.

The Tuberculosis Order of 1913 was a very good beginning. This was added to by the Order of 1914. Instead of keeping this latter Order in suspension, its provisions should have been made wider.

A more detailed study should be made of the methods of infection so as to prevent as far as possible the transmission of the disease. At the same time tubercle-free herds should be greatly encouraged. Later on selected suitable areas (which at first may be small) could be made entirely tubercle free. These areas could be enlarged, and in time embrace whole counties, so that in the different stages of the work tubercle-free animals could be obtained at a reasonable cost and without much trouble. The work should be carried out, as it were, on two parallel lines ; on one, and in front, the education of the breeder and the dairymen, and on the other the actual work of eradication.

This subject is of far more importance to the farmer at the present day than it has been in the past, due to the fact that much more attention is paid to the quality of the cattle comprising a herd, and milk recording has become very popular. If the ravages of tuberculosis are not checked, the losses to the farmer will become far more apparent.

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This is well exemplified by studying the different methods of milk production in different areas. In some districts very little apparent loss has been found to be due to tuberculosis, because it has been the general practice among the dairymen in those districts to buy in freshly calved cows, and at the end of the milking period their fattening is completed and they are sold to the butcher. They are continually changing their stock. In fact, in the past this has been a big source of revenue. In this case the owners as a whole suffer very little loss due to tuberculosis, except the milking qualities; and the feeding and the fattening of tubercular cows are compared with that of healthy cows. However, this practice of continually changing the stock is dying out on account of the big difference in the prices of milch cows and of fat cows. In other districts, especially around creameries, cows are kept on from year to year, and it is well known that the incidence of tuberculosis is very high in some of the herds of these districts.

The losses occasioned by the ravages of bovine tuberculosis may not be apparent. Take for example an ordinary farmer on whose premises the disease is extensive. He may not even suspect its extensive nature. He may have had a "piner" on his premises, then a beast is found to become a "snorer," and may remain in good condition. Next a beast may develop chronic tubercular diarrhœa, or pendulous abdomen due to tubercular liver, or become lame from a tubercular joint, or an animal may be a "bad doer." The farmer does not connect these cases, and as a rule does not even suspect tuberculosis. The majority of his animals thrive and fatten, and it is not until they reach the butcher and are slaughtered that it is found that they are affected, some of them to such an extent that the whole carcase has to be condemned as unfit for food. Even then the farmer may not be aware of the existence of the disease, as the cattle are not traced back to him, or he does not care. The loss is passed on to the butcher. It is this ignorance or carelessness of the farmers in most cases that makes it so difficult to get them to understand the ravages of the disease, or to become interested enough to take steps towards its eradication.

In those areas where the insurance of cattle before slaughter for human consumption is adopted I think it is unfair to throw the whole burden on the butcher. It is also unwise to allow Government or Municipal compensation. The farmer should shoulder part responsibility, so that he may understand the loss occasioned by the disease. Where Government aid is given it should be given liberally to the farmer who is anxious to eradicate the disease from his cattle. As a matter of fact, it is the consumer that pays in the end. The farmer

and the butcher must meet the loss by an increase in the price of meat, and this extra money paid by the consumer is a dead loss. It does not go to help in the eradication of the disease. In the average city where proper supervision is carried out over the meat supply the amount of money lost through the condemnation either wholly or partially of tubercular carcases is very considerable.

It is undoubtedly true that where stock is continually being changed the effects of the ravages of bovine tuberculosis are not to any great extent felt by the owners. It is the person who gets together the herd of high quality or keeps cows on from year to year who will suffer if he is not careful.

In many cases, although it may not be recognised by the owner, tuberculosis has proved a great obstacle to the economic running of a herd of high quality milch cows. The experience of a Connecticut breeder and dairyman, as printed in the Report of the Proceedings of the Eastern States Tuberculosis Eradication Conference, 1922, is interesting. The following is an excerpt :—

" I had a chance to observe very closely the effects of tuberculosis on a herd of cattle, and I am absolutely convinced that if any man is going to breed dairy cattle successfully—produce strong, vigorous animals that will be profitable—the first thing he has to do is be sure of it that the animals are free from tuberculosis. Tuberculosis carries in its train a host of other ills. . . . You have always an insidious something that is setting you back. In the last six or seven years, since I have been practically free from this trouble, I have begun to make some success and some progress in the making and producing of vigorous young dairy cattle."

In connection with the public health aspect of this question of bovine tuberculosis, it is amazing the state of affairs that exists in the present age. Millions of pounds are spent annually on the upkeep of sanatoria and the treatment of tubercular patients, some of whom have contracted the disease from drinking milk. Again, a great amount of attention, with a very big expenditure of money, is properly given to the housing conditions of the labour classes. Healthy colonies are projected, but little effort is made to ensure that the milk supply is tubercle free, and the good that should result from these otherwise healthy surroundings, as far as children are concerned, is considerably modified.

It is well known that the consumption of raw milk is far below what it should be, but those who could do the most in a " Drink More Milk Crusade " are deterred from doing so through fear of the bovine tubercle bacillus.

The eradication of bovine tuberculosis both from the aspect of

the loss to the farmer, etc., and from the ill-effects produced on the human subject, calls for the immediate intervention of Government to put the work on a sound basis.

I am of the opinion that so long as the administration of Orders, etc., affecting the production of milk and the eradication of bovine tuberculosis is divided progress will be slow.

TUBERCULOSIS IN SASKATCHEWAN, CANADA.*

THE report deals as follows with the matter of tuberculosis :—

" Tuberculosis affects certain domestic animals, particularly cattle, swine and poultry, and as it is a very insidious disease it is very difficult to stamp out. Even in this healthy country it is estimated that 15 or 20 per cent. of our swine are affected, and a very much smaller percentage of our cattle. As there is more danger of transmitting this disease from cattle to human beings from the drinking of milk than there is from pigs from eating of pork, more attention had been paid to reducing the amount of bovine tuberculosis than any other form.

" It has been thought advisable to get as many of the pure-bred herds free from tuberculosis as possible before beginning work on the grade herds. This work is carried out by the Dominion Health of Animals Branch under what is known as the Accredited Herd Plan, and while this plan has only been in operation for a few years, a number of the best pure-bred herds are now either fully accredited as being free from tuberculosis or are under process of accreditation.

" In the report for the year ending March 31, 1921, four herds were accredited in Saskatchewan and seventeen more were under test, or a total of twenty-one herds entered under the Accredited Herd Plan. The report for the year ending March 31, 1924, shows that there are 40 fully accredited herds in Saskatchewan, 66 more under process of accreditation, and 18 waiting to be tested, making a total of 124 herds now entered under this scheme. This shows that quite a lot of progress has been made in this work.

" There is another system of fighting tuberculosis which has been tested in the United States, and which is now being tried out in two areas in Canada. This system is known as the Accredited Area Plan, and consists briefly of taking a specified area, say a block of four municipalities, testing all the cattle within that area and slaughtering

* The Public Service Monthly Abstract from the Twelfth Annual Report of the Live Stock Branch of the Saskatchewan Department of Agriculture.

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all that react. Certain regulations, of course, are enforced in regard to cattle entering or leaving this area, but so far as the work has progressed, it appears to be very satisfactory, although, perhaps, it is a slightly expensive plan, and has certain advantages of testing isolated herds scattered through the country.

"Two or three areas in Saskatchewan are interested in this plan, particularly a block of four municipalities adjoining and on the east side of Last Mountain Lake. Full particulars in regard to both the Accredited Herd Plan and the Accredited Area Plan can be secured by writing to Dr. Barker, Regina, Sask."

TUBERCULOSIS IN THE ANNUAL REPORT OF THE CHIEF VETERINARY INSPECTOR FOR THE CITY OF LONDON.

By Lieut.-Colonel T. DUNLOP YOUNG, O.B.E., F.R.C.V.S., D.V.S.M.

An analysis of the records of the Aldgate Slaughterhouses for 1923 shows that the percentage of animals with tuberculosis was :—

Bulls	2·40 per cent.
Calves	0·04 ,,
Cows	25·45 ,,
Heifers	11·11 ,,
Oxen	1·20 ,,

The carcases showing lesions of the disease were disposed of as follows :—

	Carcases Destroyed.	Quarters Destroyed.
Bulls	— per cent.	25·00 per cent.
Calves	38·00 ,,	— ,,
Cows	47·62 ,,	1·20 ,,
Heifers	55·55 ,,	5·55 ,,
Oxen	5·00 ,,	5·64 ,,

It is interesting to observe that six of the calves, varying in age from two to nine months, were affected with generalised tuberculosis, and nearly every organ of the bodies contained lesions. In addition, three of them had acute tubercular pleurisy and peritonitis, and another had acute pleurisy. Ten of the calves were affected with localised tuberculosis, and, again, it is interesting to observe, from a point of view of infection, the positions of the lesions and the age of the animals which were as follows :—

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Number and Ages of the Calves, 2 to 6 Months.	Situation of Lesions.			
	Lungs.		Liver.	
	Parenchyma.	Glands.	Parenchyma.	Glands.
6	—	+	+	+
1	+	+	+	+
3	—	+	—	+

NOTE. + = Affected. — = No lesions.

No lesions were observed in either the intestines or the mesenteric glands.

All the diseased heifers were under two and a half years of age. Five of them were affected with generalised tuberculosis; of these one was affected in the lungs only; one showed lesions in the lymphatic glands of the head, tongue, and lungs; and one had lesions in the lymphatic glands of the head, tongue, lungs, and mesentery.

Fifty per cent. of the cows affected with generalised tuberculosis and 16 *per cent. of all the cows affected with the disease had lesions of tuberculosis in the mammary glands*, and three had, in addition, lesions in the uterus. All those cows had been producing milk.

Certain local authorities and their officers have suggested that the Tuberculosis Order, 1914, should be re-introduced. The above figures support the proposal as tending to ensure a purer milk supply.

In the Central Markets, Smithfield, 4,800 pig carcases were found affected with tuberculosis, due, doubtless, to consuming infected milk.

THE PHENOL-TETRA-CHLOR-PHTHALEIN LIVER FUNCTION TEST APPLIED TO BOVINES.

By H. E. HORNBY, F.R.C.V.S.,
Veterinary Pathologist, Tanganyika Territory.

IF the red dye phenol-tetra-chlor-phthalein is injected into the blood-stream of an animal it is rapidly removed therefrom by the liver. This fact was made known by the researches of ABEL and ROWNTREE (1909). Since then many attempts have been made to use this knowledge for devising a clinical test for human liver function. The earliest researchers to obtain results in this direction injected the drug and then ascertained if and when it could be recovered in the stools. Later, the time required for its appearance in the duodenal contents

was taken as an index of function (AARON, BECK and SCHNEIDER, 1921). An improvement on this method was made by ROSENTHAL (1921), when he examined the serum itself at definite times after the injection, and gauged liver efficiency by the completeness of removal of the drug. An improved modification of Rosenthal's technique was published by BOGEN (1923), and is briefly as follows :—

The patient is weighed and the dosage determined on the basis of five milligrammes of phenol-tetra-chlor-phthalein (or 0·1 c.c. of the sodium phenol-tetra-chlor-phthalein solution put up by Hynson, Westcott and Dunning, Baltimore, Md.) for each kilogramme of body weight. This dose in saline is injected into a vein of the right arm. Exactly one hour later blood is drawn from the left arm and allowed to clot. The serum obtained is divided into two tubes, and a few drops of sodium hydrate solution are added to one tube to bring out the colour of the dye, which remains colourless without this alkalinisation in the other tube, thus serving as a control, and the percentage of the dye present is determined by comparison with a set of standard solutions of the dye through a two-colour colourimeter. Sets of figures are given by both Rosenthal and Bogen, which indicate that if less than 3 per cent. of the dye remains in the blood-stream an hour after injection the liver can be said to be functioning normally, that a retention of from 4–8 per cent. indicates partial hepatic insufficiency, and that a retention of over 8 per cent. represents pronounced liver impairment. Similar satisfactory conclusions were drawn by GILBERT and COURY (1924) from tests applied to patients in a French hospital.

I obtained some phenol-tetra-chlor-phthalein from Messrs. Hynson, Westcott and Dunning, of Baltimore. The dye was contained in neat sets of ampoules suitable for use with human beings, and so its cost was high. Owing to this I could use it only on three oxen, but these were chosen with care as representative, on other clinical grounds, of three classes of cases, namely : those with normally functioning livers, those with partial hepatic insufficiency, and those with distinct liver impairment.

Case 1 (V.L., No. 376).—Humped ox in apparently perfect health. Full-mouthed. Good condition. Weight, 308 kilos.

He received into the left jugular vein 1·5 gm. of phenol-tetra-chlor-phthalein in the form of a 2½ per cent. solution (the liquid in the ampoules being diluted with an equal quantity of saline). Exactly one hour later blood was drawn from the right jugular, allowed to clot, and, twenty-four hours later, the dye in the serum was estimated as less than 3 per cent. of the amount injected.

Later, the liver was tested by the induced glycuronic acid test of ROGER (1922, p. 364), and again the result was perfect normality.

Finally, the beast was subjected to the severe test of being injected intravenously on three successive days with 1 gm. of tartar emetic. This also was passed without trouble. This normal control ox, then, reacted to the dye test as, theoretically, he should have done.

Case 2 (V.L., No. 1411).—Humped ox in poor condition. Full-mouthed. Weight, 160 kilos. Recently recovered from rinderpest. Fluke eggs present in dung. A typical case of the cachexia into which fluke-infested beasts fall when pulled down by such adverse conditions as drought, lactation, or intercurrent disease.

He received 0·8 gm. of phenol-tetra-chlor-phthalein. Serum from blood drawn one hour later showed only traces of the dye, namely less than 3 per cent.

Later, this beast also satisfactorily passed an induced glycuronic acid test, but he died three days after receiving the third dose, each of 1 gm., of tartar emetic given on successive days. Post-mortem examination revealed advanced fluke cirrhosis. The whole of the liver was affected, and the parenchyma near the ventral border was completely fibrosed. Nevertheless, the lobules of much of the liver, even where there was perilobular fibrosis, appeared to have been functional up to the time of death.

The dye test was disappointing in failing to reveal this considerable, though partial, hepatic insufficiency.

Case 3 (V.L., No. 1290).—Humped ox in emaciated condition. Six-toothed. Weight, 170 kilos. Recently passed through severe rinderpest reaction, and, in spite of good nursing and abundant food, would not pick up at all. No fluke eggs found in dung. On clinical grounds, by comparison with numerous similar cases, grave derangement of liver was suspected.

He received 0·85 gm. of phenol-tetra-chlor-phthalein. To my surprise his alkalined serum of an hour later showed barely a trace of the dye ; less than 3 per cent. by the colourimeter.

The induced glycuronic acid test indicated hepatic insufficiency, and the ox died a few hours after receiving his third dose of tartar emetic. Post-mortem examination showed the liver to have been in a state of such extreme venous congestion that sections of two paraffin blocks could hardly be recognised as liver ones, so complete was the destruction of liver cells. Yet according to the dye test the liver was functioning normally, and it is extremely unlikely that the degenerative changes occurred very largely between the time of the test and death.

In this case the dye test failed to reveal pronounced liver impairment.

I have referred above to the induced glycuronic acid test. This in its present form is not satisfactory when applied to cattle, but I

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hope that a modification of technique will make it so. A third test, the levulose one (see SPENCE and BRETT, 1921), I have not tried.

Conclusion.—A simple clinical test for liver function, based on the rapid removal of phenoltetrachlorphthalein from the blood-stream by the normal liver, which has given satisfaction in human medicine, does not appear to be of equal value in bovine practice, even if the initial disadvantage of expense be overcome.

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THE RAT MENACE: ITS REAL SIGNIFICANCE AND HOW IT MAY BE MINIMISED.*

BY T. MARK HOVELL, F.R.C.S.

ALTHOUGH rats are costing this country alone £1,000,000 sterling per week, continuous war is not waged against them. There is a Rats and Mice (Destruction) Act, 1919, which authorises fines to the extent of £20, but it is not put in force.

There are spasmodic efforts to reduce the number of rats, such as Rat Weeks, which, although undoubtedly doing a great amount of good, as they are the means of many thousands of rats being killed, yet, as there is no systematic destruction in their intervals, by the time the next Rat Week comes round those which escaped the previous slaughter have produced many millions of descendants.

There will be no decided diminution in the number of rats throughout the country until continuous trapping is enforced. A 5-inch rabbit trap is in many ways the best steel trap, but where a cage trap is required, the "Terrier" Death Run trap is by far the most efficient. Both can be provided with a cover, and also a signal to show if the trap is set or sprung.

The presence of a "few" rats is usually disregarded, but a pair and their descendants, with a low computation, will produce in eleven months 1,130, and in thirteen months 3,050.

Farmers usually allow their stacks to be rat-infested, but in six

* Chadwick Public Lecture delivered at the Barnes Hall, Royal Society of Medicine, on November 10th.

months 1,132 rats will eat and waste wheat to the equivalent of 23,029 quartern loaves, 306 bushels of sharps, and 723 bushels of bran.

Rats convey trichinosis (measly meat), foot-and-mouth disease, infectious jaundice, mange, ringworm, distemper, rat-bite fever, and last, but not least, plague, which during last March in the Punjab alone caused 25,000 deaths. Plague is conveyed to human beings by the rat-flea. Contrary to general belief, the flea of the brown rat transmits plague as readily as the flea of the black rat. More cases of plague occur in this country than the public are aware of, and but for very careful supervision at ports there might be serious outbreaks.

To reduce the number of rats to a minimum, all unnecessary openings into houses or buildings should be closed, as well as traps being kept set continuously throughout the year.

If pig-keepers and poultry-keepers were registered, means could be taken to ensure these rat centres being efficiently dealt with.

Virus has no advantage over the recognised poisons, and its use is strongly deprecated because it disseminates virulent microbes which the medical profession is trying to eradicate.

County Councils could obtain a considerable income by enforcing the Rats and Mice (Destruction) Act, using police stations as the centre at which information could be obtained or given. Rat clubs pay a man for benefiting himself, as the rats on his premises are a source of loss to him. A rat rate would defeat its object, for a man would not pay his enforced subscription to the rate and also expend money voluntarily to destroy the rats on his premises; his responsibility also would cease. If rat-pits were re-introduced, rats could only be procured in sufficient numbers from areas which were swarming with them.

POISONING BY GŪMCHI OR SUIS (NEEDLES).

By Major R. F. STIRLING, F.R.C.V.S., I.V.S.,
Nagpur, Central Provinces, India.

One of the manifold duties of officers in the Veterinary Department in India is to advise the police in their investigation into suspected cases of malicious poisoning of cattle.

At times such investigation leads to surprising results, but no result has surprised the author more than that of the facts relating to a case of gūmchi poisoning.

Gūmchi is the Hindustani word for the seed of the *Abrus precatorius* (natural order, Leguminosæ). These coloured seeds are daily used by the sonar (goldsmith) as a measure of weight. Ninety-six

of them equal the weight of a silver rupee (known as a "tola"). Medicinal properties are attributed to the different parts of this plant, and it is fully described in a book entitled *Indian Plants and Drugs*, by Nand Karni (1910), who writes as follows :--

"*Habitat.*—This beautiful climbing plant, remarkable for its small egg-shaped beans of a brilliant scarlet colour with a black scar, is found all over India ; spreading through the plains from the Himalayas down to Ceylon and Siam.

Properties and Uses.—Its leaves are used to relieve local pain in swellings, rheumatism, etc. The leaves steeped in warm mustard oil are applied over the seat of pain ; or they are warmed over the fire and applied after smearing the part with warm castor oil. The juice of fresh leaves mixed with some bland oil and applied to the painful part relieves pain and reduces the swelling. The juice rubbed daily to leucodermic spots for about a month has been found to remove them. The leaves are chewed and the juice swallowed in cases of hoarseness.

The root is made use of in the same manner as the liquorice root, i.e. as a laxative, and as an adjunct in mixtures. The watery extract of the root is useful in relieving obstinate cough.

The seeds contain an albuminous substance of a poisonous nature, similar in its action to the poison extracted from castor-oil seeds. Like all albuminous seeds, it loses its activity when boiled, and therefore the seeds when cooked may be even used as food. When powdered and boiled with milk they have a powerful tonic and aphrodisiac action on the nervous system.

Dose of the powder is 1 to 3 grains. If administered uncooked they act as a strong purgative and emetic. When used in large doses they are an acrid poison, giving rise to symptoms like those of cholera. The active principle has been isolated and named 'abrin.' The seeds are rubbed down with a small quantity of water into a paste and applied to contusions to reduce pain and swelling. It is also recommended to be applied to the bare skin in alopecia, in sciatica, stiffness of the shoulder-joint, paralysis, and other diseases. Mixed with the paste made of plumbago, it is applied as a stimulant dressing in white leprosy. When decorticated and finely ground, they are used for pannus cornea (vascularisation of the cornea, usually due to the irritation of granulations in conjunctivitis ; the cornea is normally non-vascular) and granular lids. They cause a true purulent ophthalmia. A 3 per cent. solution, prepared by steeping the decorticated and powdered seeds in cold water for twenty-four hours and brushed over the reversed lids two or three times a day, will cause

purulent ophthalmia. In bad cases a 5 per cent. infusion is required, or it may be prepared thus: Take thirty-two seeds, pulverise them and steep the powder in 6 ounces of cold water for twenty-four hours; then add 16 ounces of hot water, and filter. When cooled, bathe the eyes with this infusion several times a day until sufficient irritation is set up; after the first application, irritation of the conjunctiva can be noticed; on the following day severe inflammation of the eyelids will set in, lasting from five to fifteen days, when it gradually ceases, and the patient is free from pannus and granulations. Even moderate ulceration is not a contra-indication for the use of the remedy, as this ulceration speedily improves.

Native Indian preparation :—

Gunjabhadrarasa.—Take of the seeds of *Abrus precatorius* 6 parts, mercury 3 parts, sulphur 12 parts, neem seeds, *Cannabis sativa* leaves and croton seeds 1 part. Rub together and soak for one day in each of the following fluids, viz. lemon juice, juice of the leaves of *Cannabis sativa*, of datura leaves, and of the leaves of *Solanum nigrum*. This medicine is given in doses of 8 grains with rock salt and assafoetida, in paraplegia (rasendra-sarsangrah).

Gunjadya Tailam.—Take of prepared sesamum oil 4 seers, juice of the leaves of *Wedelia calendulacea* (*bhringaraja*) 16 seers, seeds of *Abrus precatorius* reduced to a paste 1 seer, and boil them together in the usual way. This oil is used as a local application in scurf of the scalp, prurigo, and other skin diseases."

The plant is also mentioned in a book called *Indigenous Drugs of India* (page 2), written by Kanny Lall Dey (1896).

So far the writer has been unable to trace any veterinary literature on this subject except that of the late Major J. D. E. Holmes, M.A., M.R.C.V.S., who, in his book entitled *A Veterinary Pharmacopœia of Bazaar Drugs*, gives the following details: Scientific name, *Abrus precatorius*; natural order, Leguminosæ; habitat, Southern Puinsula, Mysore, Assam; parts used, leaves, roots, seeds; therapeutics, roots and leaves yield an extract similar in medicinal properties to liquorice. The expressed juice of leaves is used in aptha, and as an application to swellings. Leaves powdered and mixed with jaggery (a preparation of sugar cane, R.F.S.) mitigate cough. The root is used as a demulcent bitter. The white seeds are given to cattle when suffering from anthrax or rinderpest. In large doses the seeds are poisonous, and are used for the criminal poisoning of cattle.

Preparation.—Extract: *Abrus precatorius* root sliced and dried, 1; water distilled, 5.

Syrup.—*Abrus precatorius*, fresh root, 2 oz.; Abelmoschus

capsule sliced, 1 oz.; boil for half an hour in 10 oz. water, strain, and add 8 oz. jaggery and boil to the consistence of a syrup.

Doses.—Leaves (for horses and cattle), 1 to 2 oz.; root (horses), 1 to 2 dr.; cattle, 2 to 4 dr.; sheep, 20 to 40 grains; seed (cattle), 2 to 4 seeds.

It would be just as well at this stage to make a few remarks on a certain aspect of the village life of an average Indian peasant. In his village there are certain out-castes who have the monopoly of dealing with dead animals which in the ordinary way the ryat (peasant) will not touch. These people are known as "mahars" or "chamars." Their duty is to remove the dead bodies of animals from within the village confines, and in return for this work they have the perquisite of the skins. When scarcity or famine prevails there is a great temptation for this class of people to hurry up Nature's work, and thus get the monetary benefits accruing from the sale of skins. That the local chamars have yielded to this temptation is very evident from the records supplied by the police.

The method by which gūmchi is administered to human beings and animals differs. From the material at our disposal it is obvious that the toxin is introduced into the body hypodermically. In support of this the following extracts are quoted.

Extract from Police Administration Report for 1920, paragraph 8:—

"It appears that in the year 1908 a man in the Drug District was waked from his sleep by a blow in the cheek. He did not know who or what had caused the blow, but attributed it to an enemy of his. He found he had a wound on his cheek, to which a splinter of wood and some black powder was adhering. Inflammation set in, and after ten days or so he died of erysipelas (?). The civil surgeon certified that the erysipelas was caused by dirt in the wound. Subsequently, however, the chemical examiner, to whom the wood splinter and the black powder had been sent for examination, reported that this was the powdered seed of the *Abrus precatorius*, a poison which is used for cattle poisoning, and which is said to cause erysipelas if it gets into an open wound."

Extract from *Criminal Investigation Gazette*, Bihar and Orissa, dated April 26, 1918, paragraph 295, as quoted in the *Times of India*:—

". . . Fiction writers would scorn so elementary a case as that and would dismiss it as grotesquely improbable, but they would delight in the possibilities suggested by a report of a case of sui poisoning in a human being which is given in this report. 'Suis' are small spikes

made from ground-up seeds of the *Abrus precatorius*. These seeds contain a poison which is harmless, or nearly harmless, when swallowed but which is intensely poisonous when administered subcutaneously; chamars frequently use these suis (needles) for cattle poisoning. The sui is mounted loosely in a wooden holder, with which the animal is struck; the sui remains behind beneath the skin. The use of suis in human poisoning is fortunately rare, though not unknown in the records of medical jurisprudence. If the reader knows an *Abrus precatorius* seed when he sees one, he will do well to beware of it; if he does not recognise it, he must trust to the luck which has carried him through so far."

Appendix to the *Criminal Intelligence Gazette*, Central Provinces, dated June 29, 1910. C.I.D., United Provinces, June 14, 1910:—

"MURDER BY MEANS OF POISONED SUIS IN BARIELLY, PILIBHIT AND SHAHJAHANPUR.

"Sharpened pegs (suis) rendered poisonous with gūmchi (*Abrus precatorius*) seeds have long been recognised as the regular stock-in-trade of the chamar cattle poisoner, but the use of them for the murder of human beings is a very dangerous development of the practice, which has recently been discovered to exist in the Shahjahanpur district.

"It appears that during the last three or four years a gang has been formed under the leadership of one Dhahna, chamar of village Phulwiya, district Barielly, the members of which are willing to lend out their services to anyone who is desirous of getting rid of a bitter enemy or of a dangerous rival. The members of Dhahna's gang, so far as has been ascertained, are:—

[Here comes the list of his accomplices.—R.F.S.]

"The poisoned spikes are carried in hollow reeds.

"The practice came to light in the following way:—

"A man named Likha, 'barhai' [carpenter, R.F.S.], of village Mohi-uddinpur, Police Station Bunda, district Shahjahanpur, was awakened from his sleep on the night of March 13 by what seemed to him to be a scratch or blow on the face near his eye. The next day his face became inflamed, but he did not realise that it was serious until the 16th, when he went to the Pawayan dispensary for treatment. He was at once sent to the headquarters' hospital, where he died on March 23.

"The civil surgeon attributed death to septic poisoning, and he remarked that the right eye was disorganised, and the tissues of the face, neck and temples inflamed, and the brain highly congested.

At the time this man was attacked he was engaged in litigation with one Piare Lal, 'kurmi' (a Hindu of a caste of cultivators), of the same village.

"Only one day after Likha received his injury a man named Lallusingh, who was also engaged in a civil suit with Piare, Kurmi, had an exactly similar experience, and died in hospital on March 17. In his case death was attributed to gangrene of the right temple, and inflammation of the scalp and of the right side of the face. Fortunately, however, the deceased man's brother had preserved the poisonous spikes which he had extracted from his brother's head. These were sent to the chemical examiner for examination, and the latter reported that the spikes were pieces of sui (used in

A Pod of the *Abrus Precatorius* (Gūmchi), compared with a Sixpence.

'sui poisoning'), and contained ground-up seeds of the *Abrus precatorius*. He added that a case of human 'sui poisoning' had come to his notice before, and was referred to by him in his Annual Report for 1908. The case referred to occurred in the Drug District of the Central Provinces, and was of a similar nature to these. Lallusingh, moreover, made a dying declaration, in which he accused Piare Lal of having murdered him with the assistance of three other men of the village. Subsequent inquiries disclosed the fact that one of the gang mentioned above had been seen in the neighbourhood a few days before the murder, and had visited Lallusingh's house, and had since disappeared. He was ultimately arrested, and, on being offered a conditional pardon, disclosed the names of the other members of the gang, which are noted above.

"Further inquiries show that altogether nine cases of murder by sui poisoning in the Barielly, Pilibhit and Shahjahanpur districts

were directly traced to the gang. Unfortunately, in none of these cases is evidence available to warrant a prosecution under Section 302, Indian Penal Code. In some of these, reports were made at the police station of the fact that the victims had been struck by some unknown person during their sleep, and that swelling on the face or body had occurred in consequence. If any police inquiry was made at all, it ended with sending the body to the civil surgeon for examination, who certified that death was due to pneumonia, insect-bite, or some such cause. Though in some instances pieces of the poisonous 'suis' were retained by the relatives of the deceased, in no case, until the one mentioned in the paragraph referred to above, were these sent to the chemical examiner for analysis.

"Instances of homicidal sui poisoning are known to have occurred before. Five such cases are mentioned in Lyon's *Medical Jurisprudence*, while a case in the Drug District in the Central Provinces is mentioned in the Chemical Examiner's Annual Report for 1908. Never before, however, has evidence of any general prevalence of these atrocious crimes come to light."

The Seed of the *Abrus Precatorius* (ratti), showing Scar, compared with a Sixpence.

Appendix to the *Criminal Intelligence Gazette*, Central Provinces, dated October 12, 1910:—

In the appendix to the Central Provinces *Criminal Intelligence Gazette* of June 29, 1910, an account of sui poisoning was published, in which mention was made that in the Chemical Examiner's Annual Report for 1908 a case occurred in the Drug District, Central Provinces, in which a man was killed by this means on October 23, 1908. The procedure was simple enough: a man (unknown) crept up to one Sambhoo, chamar (skinner, R.F.S.), at night while he was sleeping on a charpoy (a bedstead) and struck him on the cheek and escaped in the darkness. It was then found that the aggrieved man was bleeding slightly from three small punctures, one of which was found to contain black particles of some foreign matter: there were also some pieces of a hard blackish substance on the bed; the former unfortunately were not preserved. He was sent to Drug for medical treatment, but died a few hours after admission into hospital. The cause of death was described to "facial erysipelas," set in by the dirty state of the wound. The civil surgeon found no foreign body

in the wounds. The Chemical Examiner, however, reported that no poison could be detected in the viscera, but that the hard blackish fragments found on the bed were pieces of a sui containing the ground-up seeds of the *Abrus precatorius*. The fact of the presence of fragments of sui on the bed of Sambhoo, chamar, and the state of the wounds strongly contradict the opinion of the civil surgeon, and leave little room for doubt that this was a genuine case of sui poisoning.

A C.I.D. officer was put on to look into the case, but, as could only be expected, without any results. His investigation serves, however, to show that poisoning by suis is well enough understood by certain chamars.

The following has been gathered by the Criminal Investigation Department officer :—

Dealers in hides and chamars are prone to cattle poisoning for the sake of the hides.

When a sui is used on animals it is termed "salakh," when on human beings "khunti."

The ingredients used are a quantity of gūmchi, the sap or the milk of the *Calotropis gingantica* (vernacular "akda akh," or "madar" tree), lizards' tails, thuar milk (curds), and juice of dhatura leaves. These, when well worked up together, form a thick or glutinous paste. This again is fashioned into spikes or cones with sharp points and allowed to harden by the action of the air.

The methods employed in using the suis on animals or human beings are as follows :—

(1) The spikes are arranged on the flat end of an iron bar or bamboo, which has been previously smeared with kneaded flour (atta) to keep the spikes in place, and the animal is sharply prodded on the neck or chest so that the spikes penetrate the skin and remain in the wound. The effects of the poison is felt as soon as the blood is affected, the wound becomes swollen and gangrenous, and death ensues soon after. The greater the number of spikes used, the quicker death ensues.

(2) An iron rod, prepared as above, is inserted into the anus of an animal and pushed as far as possible, so that when the rod is withdrawn the spikes remain behind. The animal at once feels ill, the stomach becomes distended, food and water are refused, and the animal evacuates very offensive matter and dies.

Sui poisoning is prevalent in the rains, or when there is an outbreak of cattle disease.

In an Urdu volume, *Tib Maweshi*, it is stated that the poison used is composed of one part of gūmchi seed (*Abrus precatorius*), or the seed used by sonars for weighing and called "ratti," one part of opium, and half a part chinmatti arsenic worked up together and

smeared on to a pointed stick, which is thrust into an animal's mouth or any other soft part of the body. This, it is said, causes certain death.

The sui is seldom used on human beings in these provinces, and it is therefore all the more necessary to be on the alert when a case of this nature occurs to prevent its spread.

Punjab Police Gazette of January 18, 1911 :—

"The following cases of poisoning by means of suis (needles) occurred in the Amritsar district lately, and as cases of this type are uncommon in the Punjab a brief account of them is published.

"On June 21, 1910, one Ganda Singh, a resident of village Makhowal, police station Ramdas, district Amritsar, was visited in his house by one Havela Singh, a neighbour, with whom he had enmity. During the visit Havela Singh picked up a child, the grandson of Ganda Singh, and while in the act of playfully placing the child on Ganda Singh's shoulder, he drove a sui twice into Ganda Singh's neck, inflicting two minute punctures. The wounds, though small, were painful, causing Ganda Singh to cry out and to tell the neighbours of the incident. The poison in the wounds began to take effect rapidly, and Ganda Singh had difficulty in returning to Jastar, his son-in-law's village, a few miles distant. There he collapsed and was taken to the police station, and then to the Ajnala hospital, where the punctures were found to be $\frac{1}{4}$ inch and $\frac{3}{4}$ inch deep, respectively, the surface of the skin being red and swollen. Ganda Singh was taken back to the village after treatment, and died on June 27th, six days after the punctures had been inflicted.

"The civil surgeon who made the post-mortem had no doubt that the two minute punctures on the neck, such as might have been inflicted with a needle, were the cause of the death, but neither he nor the Chemical Examiner were able to trace any of the poison which had apparently been absorbed into the system.

"This case was first dealt with under Section 324, Indian Penal Code, and Havela Singh was admitted to bail. While on bail he struck a sui into the back of a man named Kehr Singh, in the Amritsar city, on June 11, 1910. Kehr Singh went into hospital for treatment and recovered. The sui used for poisoning in such cases is thus described by Lyon :—

"'A sharp-pointed spike, about $\frac{3}{4}$ inch in length, made of a paste prepared by pounding the decorticated seeds of *Abrus precatorius* (commonly known as "ratti," and used as weights by jewellers) with water and hardened by exposure to the sun. The spikes are inserted into holes in a wooden handle. A blow is then struck with

force, with the spike protruding from the handle, driving it into the flesh, where it is left, and soon causes death.' "

It is now necessary to discuss gūmchi poisoning from a veterinarian view.

The chamar (cattle skinner) of the village finds that he is in debt. Fortunately for him, and unfortunately for the animals of the village, an outbreak of blackquarter occurs, the symptoms of which closely resemble those of gūmchi poisoning. Aided by the male and female degenerates of the village, he introduces this poison *per rectum* as indicated in extracts quoted above.

So far the writer has only met with one case which he could recognise in life as a case of gūmchi poisoning.

The full details of this case are appended :—

Subject.—White bullock, aged five years. Date of admission into hospital, March 9, 1924.

History as given by the Owner.—The bullock was sent out for grazing with the other village cattle in the usual way. He strayed into the field of an enemy of his owner. In the evening, when the bullock returned, it was noticed that he had a swelling of the hind quarters and was lame. Some sweet oil was applied over the swollen part, and the usual food was given.

On the following morning the animal was found prostrate, unable to rise, and the swelling had increased considerably. The major portion of the food supplied on the previous night had not been eaten.

Next morning the owner became alarmed and examined the bullock carefully. He found that some reddish-black material had been introduced into the rectum, and he immediately suspected poisoning. In the first instance he thought that this reddish-black material was " sinthoor," one of the mercurial preparations generally used by women for " tilak " (decoration of the forehead). He was a ryat, or Indian peasant, and, true to type, he tried all sorts of local medicine as advised by the village ancients. These having failed, the animal was brought to the Veterinary Hospital, where the following symptoms were found :—

Symptoms.—Temperature, 104·2° F., which gradually dropped to sub-normal until just before death, when it was only 90° F.

There was a very large swelling of the hind quarters, particularly noticeable on the left-hand side. The swelling was œdematous, hot and painful, and crackled on pressure, and could easily be mistaken for the local symptoms of blackquarter. Here and there over the swelling hairless patches were noticed : these were probably due to excoriation of the skin in bringing the animal to the hospital on a rudely fashioned country cart. The back was arched. The face had

that peculiar drawn expression which is so common in peritonitis; this symptom of peritonitis is described by Taylor, so far as can be remembered, as an "expression suggestive of the fear of impending death."

There were muscular tremors all over the body, and the animal was unable to stand.

Pulse and respiration were both much accelerated at the beginning, but as time went on the pulse became imperceptible.

Defecation was most painful, the rectum being much inflamed and slightly everted with abrasions of the mucous membrane, and some reddish-black staining was noticed. Urination caused extreme pain, and the urine was bloodstained.

Treatment.—Treatment was symptomatic, and the animal died in a comatose condition on March 11, 1924.

Note.—It was most unfortunate that a post-mortem examination could not be made on account of the religious objections of the owner.

General Remarks.

The author can only place before his readers the material available, and is diffident about coming to any definite conclusions as to the frequency with which this poison is used. The quotations are produced exactly as written by the authors of them.

Much help has been given in the writing of this article, but in particular thanks are due to the following gentlemen :—

(1) Mr. F. S. A. Slocock, C.I.E., I.C.S., late Inspector-General of Police.

(2) Mr. R. V. Pillai, G.B.V.C., Offg. 2nd Superintendent, Civil Vety. Dept., C.P.

(3) Mr. P. S. Nair, G.B.V.C., Veterinary Assistant, Nagpur Dispensary.

(4) All officers of the Criminal Investigation Department.

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GENERAL ANÆSTHESIA AS AN AID TO PARTURITION IN CATTLE.

By RALPH BENNETT, F.R.C.V.S.,
Romford.

As I have seen very little literature on this subject, it has occurred to me that a few notes on its practical application may be of interest. For some time I have made a practice of giving a general anæsthetic in difficult calving cases, and also in cases of inverted uterus. I have found this so beneficial both to the patient and to the operator that I am quite convinced it should be observed in all except the simplest cases. I think the summary of the following cases shows quite clearly that a really difficult presentation may be delivered easily and quickly without inflicting unnecessary pain on the animal when an anæsthetic is given, whereas without it, as is only too well known by all country practitioners, a bad calving case is a long and exhausting experience for the veterinary surgeon, and only too often the genital passages of the cow are torn and injured, with the result that septicæmia sets in; and what ought to have been a good, successful case results after all in the death of the animal from septic infection.

My experience shows that chloroform may be safely and easily given to cows, with even less risk and trouble than to horses.

The anæsthetic may be given to the animal in the standing position without any further restraint than a rope on the horns tied to a post or to the manger; the cow takes it very quietly, and lies down or gently collapses of her own account. If already recumbent, I administer the chloroform in that position without tying the feet or using any restraint other than the head rope.

I use an ordinary chloroform muzzle open at both ends, one end fitted over the animal's muzzle and the other end being fitted with a tray to carry the sponge: this tray being perforated on both front and back sides so that the air is freely drawn through the sponge and takes up the chloroform in its passage. The open end of the muzzle is very lightly covered in the early stages by a light piece of sacking, which may, as a rule, be dispensed with once the anæsthesia is complete. The usual initial dose of chloroform varies from 1 to 2 ounces, according to the strength of the cow; and the quantity required, even for a bad case, is seldom more than 4 ounces.

XUM

Notes of nine cases of parturition and one of inversion of uterus taken from my case-book of this year :—

1. *Shorthorn.*—Breach presentation, with hind legs projecting forward towards shoulders. The cow was down in a small low box, so there was no convenience for raising her hind quarters by means of a pulley. Without an anæsthetic it would certainly have been very difficult to turn the hind legs into proper position, but after chloroform was given this was easily accomplished, and the calf delivered hind feet first. Time taken, including giving of anæsthetic, about forty-five minutes.

2. *Cow.*—Labour had been overlooked for probably four hours. Calf dead and decomposed. Fore legs in passage, head inclined to right, below brim of pelvis. After anæsthesia was complete it was possible to get a hook into left orbit, which held just long enough to bring muzzle of calf into vagina. Traction was applied to legs, and by a hook in right orbit to head succeeded in delivering calf. This cow was in a very bad state at time of operation, and had to be destroyed three days afterwards. I think delivery would have been impossible without an anæsthetic.

3. *Friesian Heifer, First Calf.*—Seen on March 5th, when owner thought calving was coming on, exact date due was not known. The vagina was very small, so that on examination it was difficult to reach os uteri. There was no evidence of calving at this date, so case was kept under observation. The cow was found showing symptoms of calving on the evening of March 8th, but I was not sent for until the morning of the 9th, when I found labour well advanced and calf dead, the fore legs were born, and crown of head was in anterior end of vagina with nose doubled back. Vagina was still so much constricted that it was very difficult to pass the hand beyond head of calf. When anæsthesia was complete the vagina relaxed considerably, and it was possible to pass rope round head below eyes. Traction applied to the rope turned the head and brought muzzle of calf towards vulva ; a hook was then put in orbit and ropes on front legs, and calf was quickly delivered. I doubt if head could have been turned if anæsthetic had not been given, but if it could have been forced round the vagina would certainly have been badly lacerated in the process. Time taken, about twenty-five minutes.

4. *Shorthorn Heifer, First Calving.*—Had been noticed to be in labour for twelve hours. Examination revealed the side of calf, ribs and one elbow being quite distinct ; further examination disclosed two fore legs, bent at knees, two hocks under body of calf right down below the pelvis of the heifer, and also the crown of a head on the right side with its nose projecting well forward out of reach. After

further examination, concluded that the fore legs and head belonged to one calf, and that the hind legs belonged to a twin calf. I decided to deliver the calf with head presented first, so the fore legs were straightened and brought into passage; then a hook was put into eye socket and head gently pulled forward, but the head could not be turned by traction on the hook, so hook was taken out and body of calf pushed back and the nose brought round with the right hand. This manœuvre was only possible owing to the complete anæsthesia. The hook was then re-inserted in orbit and lines put on fore legs, and gentle pulling quickly delivered a dead calf. The twin calf came with breach and hock presentation, the hind legs were easily turned by pressing back points of hocks each in turn and pulling up the feet by hand without roping. Ropes were afterwards applied to the hind legs in the ordinary way, and a live calf was delivered. Time did not exceed forty minutes.

5. *Cow, Third Calving.*—Labour had been noticed all day, but I was not sent for until about 7 p.m. On breaking the bladder a large quantity of thick, dark, golden-coloured fluid escaped. Examination revealed a breach presentation, tail and buttocks only to be felt. After giving chloroform a further examination showed the hind legs were projecting well forward, the stifle and thigh of the right hind leg being within reach. After some trouble a rope was passed round the thigh and leg pulled so that hock could be reached; further traction made it possible to reach foot and put a rope below fetlock; the point of hock was pressed back by hand, and traction applied to rope in order to turn leg, but the fetlock suddenly gave way and the foot pulled off. The rope was then applied to distal end of metatarsal bone, and after considerable difficulty the leg was got up into passage. After this two feet and a nose could be felt down towards right flank of cow, it was concluded that these belonged to a second calf, so further search was made for the left hind leg; the stifle of left hind leg was found at last well down towards the cow's left flank. A rope was got round the thigh, and the leg pulled towards operator; the rope was then shifted just over hock, i.e. to the same side as the foot, traction applied to the rope, at the same time pressure was applied to point of hock by hand, but it was impossible to turn the leg owing to the weight of the calf pressing on it. The cow was then turned completely over to relieve the pressure. A crutch was then placed on calf's buttocks and the calf pushed forwards, at the same time traction was applied to the rope on leg, this succeeded in bringing the leg up and the calf (dead) was quickly delivered.

The second calf was in normal position, and was delivered by putting hook in left orbit and ropes on front legs. Time, one and a half hours.

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6. *Jersey Heifer, First Calf.*—Found head and front legs just within os uteri, calf alive, front legs were deformed and partially anchylosed at fetlocks. Head and legs were easily brought into vagina, but traction which apparently should have effected delivery easily did nothing beyond bringing head and legs just to vulva. The neck appeared unnaturally long. The cow was then chloroformed, and traction applied with a pulley to rope round calf's neck. After some effort a sudden movement brought calf forward, and then several gallons of white liquid escaped. This was afterwards seen to come from abdomen of calf, which had ruptured through pressure; the calf was then easily delivered. It was found that the calf's pelvis was deformed, being quite flat and shut down on itself like an opera-hat; the hind legs were also deformed, the hock-joints being a combination of hock and knee formation. The difficulty in delivery was due to the excessive dropsy of the abdomen of calf.

7. *Jersey Heifer.*—Head and left fore foot just within os uteri. Pains had evidently been overlooked, as parts were dried up, and it was a matter of some difficulty to pass hand into womb. After giving anæsthetic a hook was put into orbit and calf pulled towards operator. The left fore leg was flexed at knee, this was straightened and brought through os by hand (fortunately calf was very small); the right fore-limb could not be felt at all. After delivery this right limb was found to be stretching back from shoulder in an almost straight line. Delivery was finally effected by traction on ropes round neck and left leg.

8. *Shorthorn Heifer, First Calving.*—Pains practically absent. Examination revealed head with nose turned below rim of maternal pelvis, and fore legs flexed at knees. Hook put in orbit, head straightened and brought into vagina. Front legs roped and calf delivered. Further examination showed another calf coming hind feet first. This one presented no difficulties, and was soon removed.

9. *Shorthorn Heifer, First Calving.*—Had been in labour fifteen to eighteen hours. The calf was premature, probably about seven months, but exact time not known. The vulva and vagina both small, and not normally relaxed, and very dry. Two legs presented, "one broken" at fetlock. Calf dead and distended with gas. Head was turned round to left and lying alongside the left ribs. After giving chloroform a hook was put into orbit and head brought into normal position, and delivery effected without further trouble.

This would have been a difficult case had chloroform not been given, owing to the putrid condition of calf and the smallness and dryness of passages.

All the above cases, except No. 2, made uneventful recoveries.

10. *Inversion of Uterus.*—This case presented no especial points, except that the cow was down in a very small low loose box, much too low in the roof and weak in structure to make it possible to raise the cow's hind-quarters by means of pulleys. The uterus was completely inverted. After giving the anæsthetic I was able to replace the uterus while the cow was lying flat on her side in this small place. (No other place was available even if cow could have been made to move, though movement was out of the question owing to cow refusing to get up.) A truss was applied to keep womb in position. Recovery was uneventful.

The two points I wish to emphasise in these cases are :—

1. The ease with which abnormal presentations of head or limbs may be corrected after an anæsthetic is given.

2. The fact that very much less force is needed to extract the calf when the cow is anæsthetised owing to the relaxed condition of the genital passages.

RECENT DISCOVERIES IN MESOPOTAMIA.

By A. E. BAYLEY, M.R.C.V.S.,
London.

A SHORT time ago I visited the British Museum with a friend to look over the exhibits which had recently been placed in the Assyrian Saloon. My attention was particularly arrested by a Mosaic panel which, according to the explanation accompanying the exhibit, had been recovered from an ancient temple at Tel-el-Obied, the foundation stone of which, with the name of the King of Ur and the date (between 4000 and 3000 B.C.), being also shown. This panel with the scene of milking cows is a contemporary illustration of domestic life at a time which was hitherto almost legendary, and the high technical and artistic quality of these works proves that an advanced stage of civilisation existed in the Euphrates valley before the First Dynasty of Kings of Egypt.

By the courtesy of the Director of the Museum, Sir Frederick Kenyon, I am able the better to illustrate what I conceive to be one or two points of special interest to modern veterinary practitioners. Sir Frederick has been good enough to allow the publishers to make use of a block prepared from an excellent photograph of the frieze, which appeared in *The Times* newspaper early in the present year.

Before drawing attention to these special points I would venture to quote from an article by Mr. C. Leonard Wooley in the *Antiquaries' Journal* for October last.

" The most interesting portion of the frieze gives us a *genre* scene

of pastoral life. At one end are two men milking cows; the men are squatting awkwardly under the cows' tails (the same position for milking is adopted to-day by some of the Lower Mesopotamian tribes), and hold long slender milking-vessels; in front of the cows stand the calves, duly muzzled so that they cannot get milk for themselves. In the centre is a byre. It is built of big reeds (?) bound with ropes; it has a kind of entrance-tower with a window above the door; the door itself is flanked with spears and adorned with the peculiar side loops familiar to us from pictures of Sumerian buildings; above is a sort of crescent which may be derived from the sacred horns. From the door of the byre issue two heifers. On the other side of this building are four men, dressed in the usual sheep-skin skirt, engaged in straining and storing a liquid which we may guess to be clarified butter resulting from the milking operations conducted at the opposite end of the scene. The man on the extreme left has plunged his hand into a great jar, presumably to draw out the liquor from it; the next man is pouring the liquid from a small jug into a strainer held by his fellow, from which it runs down into a big-spouted jar set on the floor. The fourth man has between his knees a great stone jar destined to receive the strained liquor. From every point of view the panel is of the utmost importance for the light it throws on the domestic life of the Sumerians at this early period, as an illustration of the art of the time, and for the possibility it gives of dating other objects."

The interest to the veterinary surgeon and possibly to the practical dairyman lies in the position of the milker. Did these ancient pastoral tribes know of the peculiar anatomical comformation of the acetabulum joint of the ox which prevents undue extension of the hind limb in the backward direction and thus secured comparative safety to the milker? Was the peculiar crouching position assumed by the milker intended to prevent contamination of the milking-vessel?

There is one other point of some interest. It does not appear quite clear from the photograph or from the original panel itself whether it is the tail of the cow or something else which appears to issue from the rectum and sweep over the milker. Mr. Sydney Smith, of the Egyptian Department of the British Museum, who was engaged on the work of excavating in Mesopotamia, informs me that there is a legend in that country based on a story by Herodotus that during milking a hollow tube of bamboo or other material is inserted into the rectum. I have had some corroboration of this story from a conversation with a retired A.V.C. Officer, who states that undoubtedly the practice prevails in certain Eastern countries of tickling the vaginal canal during the process of milking with a view to increasing

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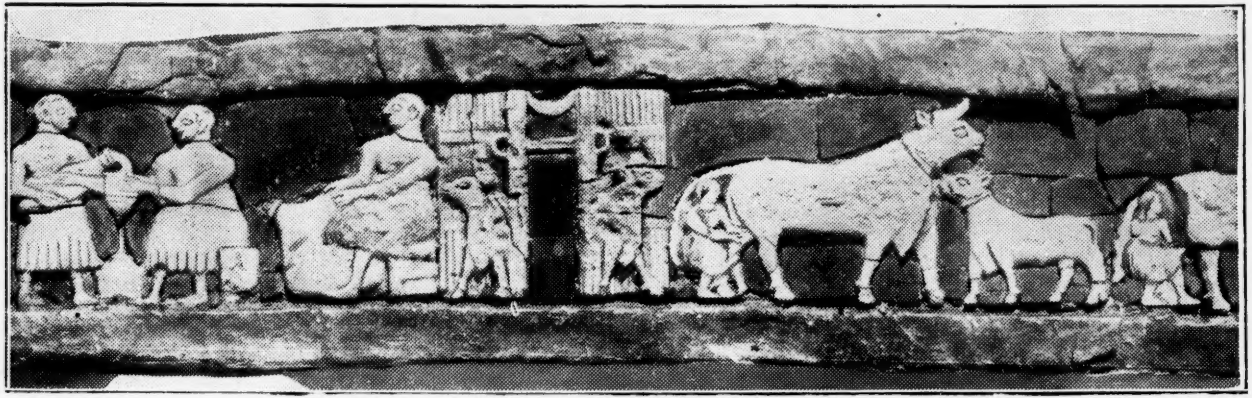
THE PANEL



For convenience of printing it has been found necessary to cut the block prepared from the original photograph, but all the salient features mentioned in the text still remain.

the yield of milk, and that experiments show that the milk supply is thereby augmented to an appreciable extent.

A further matter of interest is the shape of the milking-pail. It is described as reaching down to the ground. It would, therefore, presumably possess a small diameter at the open end and offer the minimum of risk of contamination to its contents. It is useful to contrast this kind of milking-pail with the one in use nowadays which offers every facility for the entrance of material which may pollute the milk.

TERMINATION OF THE VORONOFF TESTICLE-TRANSPLANTING OPERATION ON THE BOAR.

By FREDERICK HOBDAY, C.M.G., F.R.C.V.S.,
Kensington, W.

In the VETERINARY JOURNAL for June last I reported a clinical note describing in detail the application of Professor Voronoff's testicle-grafting operation upon a valuable pedigree boar, for whom the sum of five hundred guineas had been paid, and whose success at stud in the way of begetting progeny had been most disappointing.

Briefly the facts were as follows: On the 9th of March, 1924, the animal, three years old, was chloroformed, together with another of the same breed, but only ten months old, and the two were placed side by side. Under strict asepsis sections were removed from a testicle of the younger animal and grafted by satures on to the exterior of an exposed testis of the older boar.

The grafts apparently took well, the wound healed by primary union, and the boar was put to use at service some two months later. The report of the owner was that "he served his sows with great vigour," but the sequel, as regards the production of progeny, was no better than before, and in August the animal was destroyed.

Owing to some misunderstanding, unfortunately no proper post-mortem examination of the testicles was made, so that I am unable to report the actual macroscopical or microscopical conditions of these glands afterwards.

Abstracts of Current Literature

Casparius.—Anti-Tuberculous Vaccination according to the procedure of Dr. Friedmann.—*Schweizer Archiv für Tierheilkunde*, August, 1923.

IN view of the enormous losses occurring in every country from the ravages of tuberculosis, it is superfluous to dwell on the merits

of an effective vaccine. The processes of immunisation recommended by Koch and Von Behring have been forgotten for some time as they were ineffective. The results obtained by Casparius, however, with the use of Dr. Friedmann's vaccine, have been so encouraging that he warmly recommends it. Friedmann's vaccine is composed of pure cultures of tubercle bacilli of the tortoise. This bacillus of the tortoise presents not only the cultural, morphological, and tinctorial characters of the human bacilli, the bovine and the avian, but also biological characters absolutely identical, for it gives birth to homologous antigens, that is to say, specific products involving in man, bird, and ox, antituberculous antibodies which prove the curative value of Friedmann's product in human, bovine, and avian lesions. The pathogenic properties of the bacillus of the tortoise differ from those of the bacilli of warm-blooded animals. Some bacilli of mammiferous type suffice to render the guinea-pig tuberculous, but the bacilli of the tortoise are so harmless that an injection of one thousand, thousand million of bacilli (500 milligrams of dry culture) does not render a guinea-pig tuberculous.

Casparius asserts that he has treated 1,820 bovines and 1,200 fowls affected with serious tuberculosis provided from cow-houses and poultry yards severely infected. The diagnosis of tuberculosis has been confirmed in bovines by microscopic examination of bronchial secretions and milk, in fowls by the autopsy of birds affected with miliary tuberculosis of the liver and intestines. After the injection of "Friedmann" in cattle gravely affected, Casparius notes the following symptoms, sometimes even after eight to ten days: The toxic symptoms improve, the cough and the fever decline, the coat and the appearance become more alive, the weight increases rapidly. In six cases Casparius affirms that tuberculous mammary swellings atrophied to the point of complete disappearance. If at the time of injection the foci are softening, the abscesses are opened and mammary cicatrisation proceeds gradually. Lacteal secretion is tripled and even quadrupled; the milk loses its bad physical characters, and finally in four to six months it is harmless when subcutaneously injected into the guinea-pig. In fifty-five cases Casparius noticed the following at the autopsies: miliary tubercles growing on the lungs were arrested in their development and incrusting themselves with calcareous salts; caseous pulmonary foci were surrounded by a thick fibrous matrix cutting them off from healthy pulmonary tissue. If one has to treat sick animals or simply suspects it is necessary to submit all the animals in the shed to vaccination. A single injection of the prescribed dose for cattle suffices for therapeutic and immunising purposes. If therapeutic effects are not

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shown after one injection a second dose may be given at the end of two or three months. Subcutaneous injections ought to be made with syringes sterilised with hot water without the addition of alcohol, ether, or other antiseptics, and no salt, soda, nor other products must be put in the water. The results obtained in cattle have been no less marked than in birds. Animals most gravely affected died, but the others recovered in surprising fashion, invalid fowls becoming strong and healthy.

Tierarztliche Rundschau queried seventy-one veterinary surgeons on the effectiveness of " Friedmann." Seven had no success, twenty-two were indefinite, and forty-two recorded striking successes.

The Commission appointed by the Prussian Minister to examine the efficacy of the vaccine reported that " The vaccine is not harmful ; it is valuable in the antituberculous struggle as having given surprising results after one or two injections."

Davis, Haldin.—Case of Tuberculosis of the Skin following a Cat Bite.—*Proceedings of the Royal Society of Medicine, Section of Dermatology*, July 1922.

PATIENT, a male, who was bitten on the back of the hand by a cat nine or ten months ago. The wound never healed properly, and in the scar there gradually developed the present lesion, which is red and exhibits a few points of suppuration. On the palmar aspect of the thenar eminence are four little apple-jelly nodules marking the imprint of the animal's teeth. The clinical diagnosis has been confirmed by a microscopical examination of a piece of the lesion. Tuberculosis in cats is somewhat rare, but Petit has found in doing a number of autopsies of stray cats that about 2 per cent. of them were tuberculous. The disease in these animals affects the intestinal tract far more often than the lungs, hence the danger of infection from a bite. Another point which adds to the danger of infection is that tuberculous lesions in cats are usually much richer in tubercle bacilli than the corresponding lesion in human subjects. A few years ago Sir Arnold Lawson published three cases in which children had contracted fur infections from cats, one of which was tuberculous.

Bitte of Riga.—Delphinium Poisoning in Cattle.—*B.T.W.*, September 26, p. 536.

ON June 27th B. was called to a cow which was tremendously " blown up." The tympanitis was disappearing tumultuously. The animal was down in the pasture. On the ground not far from the back of the cow there were enormous masses of dung, which had an

elongated form, and were porous, almost like baked bread. B. estimated the masses of dung at about four or five times the normal quantity.

History.—In the garden as an ornamental plant there was a perennial, blue-flowering larkspur (*Delphinium elatum*) in full bloom. It had grown well up, and two handfuls of stalks had been broken away. The cow had picked them up and eaten them, and was then turned out on the meadow, where the tympanitis had occurred. The cow fell down and defecation resulted, and the tympanitis disappeared. The whole event took place in a period of one and a half to two hours.

On Examination.—Head erect, disturbed look, able to notice surroundings, body surface cold, pulse 36, respirations 18 per minute. Body temperature, 36·4° C. Intestinal murmurs suppressed. Unable to stand up, raising the fore-quarters, but not the hind.

Treatment.—Heart stimulants, alcohol.

Course.—At five o'clock next morning the cow got up and began to move eagerly about the meadow. On the second day the milk supply returned to normal.

Herion, M. F.—A Case of Gangrenous Cystitis in the Cow.—*Echo Vétérinaire*, June 1923.

A cow from which a very big calf had recently been forcibly extracted showed colic, with difficult and painful micturition. Vaginal exploration showed a projection from the urinary meatus of a greyish piece of tissue of gangrenous aspect. This obstructing body was carefully drawn out and extracted, and immediately an abundant flow of liquid of urinous ammoniacal odour escaped. After slight improvement, violent colic recommenced, and slaughter was decided on. Autopsy showed an area of gangrenous cystitis, with resultant peritonitis, although the walls of the bladder were not torn. The seriousness of wounds of the vaginal mucosa does not depend wholly on their extent, their depth, or the nature of the organisms which infect it; it depends above all on the point as to whether or not they involve the urinary meatus. If this meatus is not wounded, simple antiseptic care brings about rapid cure. If it is involved, the case becomes grave as a result of the possibility of ascending infection of the urinary tract.

Ries, J. N.—Paresis of the New-born Foal.—*Revue Vétérinaire*, October 1924.

THIS affection strikes foals immediately after birth. It declares itself by general weakness, followed by permanent repose. Then

very pronounced tachycardia appears, with a slight increase in respiration. Hypothermia occurs, and the animal dies with cyanosed mucosæ in two or three days.

This affection is due to persistence of the arterial canal. The posterior aorta on this account received mixed blood and anhematosis is the result. Treatment involves gaining the time necessary for the obliteration of the canal. The injection of fresh blood might be tried. The treatment of the mother during the last period of gestation is also indicated.

Maignon, F.—Treatment of Eczema by the Administration of Tissular Diastases of Liver Thyroid.—*Bul. de Soc. cent. de Méd. Vét.*, June 30, 1923, p. 259.

As a result of research into avitaminosis of the pigeon, Maignon has been led to believe that the liver plays an important rôle in the nutrition of the skin, and to consider that tissular diastases from the liver ought to exercise a favourable action on subjects affected with chronic eczema. One dog affected with chronic eczema received daily injections for six weeks of hepatic diastases in physiological serum and was considered cured at the end of this time, but a month later there was a recurrence of the condition, so alternate injections were made of thyroidean and liver diastases. The thyroidean diastases had a most marked effect on the state of the skin, whilst the liver diastases exercised their action on the growth of hair. After three months' treatment cure was complete. This dog seemed in a hopeless condition when brought in.

Since then five dogs have been treated with liver and thyroid diastases and all have been cured. The thyroidean diastases produce betterment of the skin condition, but exercise no action on the growth of the hair, which is however greatly favoured by the hepatic diastases.

Herneath, A.—Protein Therapy in Fowl Diphtheria.—*Allatorvosi Lapok*, 1923, p. 85.

In a poultry yard three fowls were affected with diphtheria, showing the following symptoms: dejection, rattling breathing, no food taken, diphtheroid membranes, greyish white buccal and pharyngeal mucosa, muco-purulent discharge. In these three fowls as well as some others that looked dull and dejected 96 to 128 minims of boiled milk were injected. Some hours later the fowls were already lively; the appetite returned and local symptoms abated; after two days there was no trace of the malady and the extension of the epidemic was checked.

Zoperfido, Dr.—A Case of Nodular Necrotic Hepatitis of Uterine Origin in a Cow.—*Nuovo Ercolani*, December 31, 1923.

NODULAR necrotic hepatitis of cattle is considered as infectious with two possible sources of origin: the intestine and uterus. The author reports a clinical observation in which the origin of the affection was undoubtedly uterine. The sick cow was feverish after parturition, showed signs of metritis, quickened pulse and respirations and loss of appetite. The condition became aggravated, and soon jaundice appeared, which was apparent on all the mucosæ and even on the mammary skin and perinæum; death ensued. Post-mortem showed severe septic metritis. The liver was hypertrophied, with well-defined nodules of necrotic hepatitis surrounded by healthy tissue. The nodules were of hazel-nut size. The author thinks that the uterus was primarily affected with Bang's bacillus.

Faure, M.—Histology of the Skin in Demodectic Mange of the Dog.—*Recueil de Médécine Vétérinaire*, February 15, 1924, p. 112.

THE author classes the histological changes of the skin in demodectic mange as follows:—

1. *Stage of Invasion.*—The skin is histologically normal, the demodex is situated in the hair follicle, head towards the depth of the follicle (classic stage).

2. *Stage of Inflammation.*—This stage is characterised by an inflammatory reaction of the skin at the periphery of the follicle and of the annexed sebaceous glands; infiltration of leucocytes mostly polynuclear, hypertrophy of fixed cells, some being charged with ochre pigment, some giant cells of 15 to 20 microns in diameter, and with 4 to 6 nuclei. The sebaceous glands are hypertrophied and hyper-functioning, the hair follicles considerably dilated, crammed with the demodex.

3. *Stage of Suppuration.*—It is characterised by the formation of true sub-epidermal abscesses filled with macrophages, polynuclear leucocytes with destruction of the dermis, communication with the subcutaneous conjunctive tissue, and emigration of a certain number of parasites into this subcutaneous connective tissue.

This point is modern; it is contrary to the classic view that the parasites always remain resident in the follicles. It explains the origin of the very obstinate complications of demodectic mange.

4. *Stage of Extension.*—Marked by multiplication, confluence and fusion of lesions similar to those described without different alterations of the skin.

These facts allow of interesting deductions on the evolution of

the complications of follicular mange of the dog and on the varieties of treatment that can be opposed to it according to the stages of its evolution.

Ludwig, Hans.—Infectious Abortion in Cattle.—*Schweizer Archiv f. Tierhlkude,* October 31, 1924.

AFTER some praiseworthy experimental research and investigation the author comes to the following conclusions :—

1. Infectious abortion (Bang) is very prevalent in this district (Murten).

2. To be sure of diagnosis a bacteriological or serological examination is absolutely necessary. If the serological test is conducted with several stocks the result is very reliable.

3. The symptoms of nodular disease bear no relation to abortion infection. The many sequelæ attributed to nodular disease (not coming in season, endometritis, pyometra, abortion) are solely the results of abortion infection.

4. Immunisation of infected stock with living abortion cultures was accompanied by success. The inoculation of killed cultures into pregnant cows was useless.

5. On inoculation with living abortion cultures the animals usually reacted with fever of short duration and slight falling off in milk. Capricious appetite seldom noticed. Occasional swellings and abscesses at the places of inoculation are of no significance. By careful distribution of the inoculated material by massage they can be avoided.

6. Although the effect of living cultures is to make the animal ill, the employment of them should not be avoided on this account.

7. The transmission of the abortion bacillus occurs primarily through the breeding animal ; any other way of transmission was in no case established with certainty.

8. Also the immunised animal offered no guarantee that abortion could not be transmitted purely mechanically in the covering act.

Cameron, T. W. M.—The Dog as Carrier of Disease to Domestic Animals.—*Scottish Journal of Agriculture,* vii, 1924.

THE dog has always been regarded by the veterinary surgeon as a probable spreader of disease, and although most of us have at one time or another found cases in which it was actually doing so, few will realise how great are its potentialities in that direction. This paper, which is to some extent a sequel to one by the same writer on its relation to man, is intended to bring to the notice of the agriculturist the danger of the dog to other live stock. Dr. Cameron deals briefly and mainly from the preventive point of view with such

diseases as rabies, anthrax, foot-and-mouth disease, tuberculosis, hydatid, gid, "measles," "tongue-worm," ticks and mange. He only very shortly draws attention to the bacterial diseases, but gives more details of the parasitic infections. His concluding paragraph is of sufficient importance to be quoted *in extenso*: "All of the above diseases are found in Scotland"—and we may add in England also—"and many are actively transmitted by dogs to stock. The greatest and most obvious danger is from the ownerless dog—a class of animal fortunately uncommon in this country. The authorities have the necessary power to eliminate this animal. Almost as dangerous, however, is the dog with an irresponsible or careless owner—and their number is legion. The dog which is properly trained and disciplined, and which is kept under proper conditions of confinement, housing and feeding, is an invaluable friend and ally to the farmer. Otherwise he is at least a nuisance and often a menace to the community. Many of the above diseases are easily eliminated, or at least kept under control, if all dogs are properly restrained and if all infective material is destroyed. Feeding the dog on good clean food is essential, but in itself is of little value unless infective offal, tape-worm cysts, and so on are destroyed. The dog, in spite of feeding, will, on account of his ingrained instincts as a scavenger, duly seek them out and devour them. Farm dogs especially must be periodically inspected for parasites and carefully treated. More than one course for treatment of tape-worms is essential. In fact the medicine should be repeated at intervals until no more worms are passed. Proprietary remedies are often of doubtful value. Each type of worm requires its own special drug, and a pill which guarantees to remove all worms must be looked upon with suspicion. In the aggregate the damage done to stock by the dog must amount to millions of pounds—and it is practically all preventable."

Le Roux, P. L.—Helminths collected from Equines in Edinburgh and London.—*Journal of Helminthology*, 1924, ii. pp. 111–134.

THIS is a most valuable contribution to our knowledge of the parasites of horses present in this country, and it not only shows the presence of many forms not hitherto recorded, but also of some new to science. In one donkey examined, twenty-six species of nematodes were found—fifteen of which had not previously been recorded from England. In horses, thirty-eight species of worms were recorded from London—nineteen being new to England—and thirty-eight from Edinburgh, of which eleven had not been recorded from Scotland previously. In addition to the ascarids, oxyurids, and strongyles, the writer records *Habronema microstoma* from the stomach,

Trichostrongylus axei from the same location, and *Dictyocaulus arnfieldi* from the lungs. All of these are parasites not generally suspected in this country, and all three are capable of causing considerable damage.

Goodey, T.—The Anatomy of Œsophagostomum Dentatum.—*Journal of Helminthology*, 1924, ii. pp. 1-14.

Goodey, T.—Œsophagostomes of Goats, Sheep, and Cattle.—*Journal of Helminthology*, 1924, ii. pp. 97-110.

THESE two papers by Dr. Goodey describe the œsophagostomes of all the domestic animals. These parasites are of considerable importance, and include the notorious agents of nodular disease of the intestine of sheep and cattle. It is surprising that hitherto no thorough modern account was available. Dr. Goodey has, however, supplied detailed descriptions of all the species and placed our knowledge on a firm foundation.

Clark, Harry, and Sturm, Ernest.—The Production of Persistent Alopecia in Rabbits by Roentgen Radiation : A Study of the Minimum Dose required and the Consistency of the Reaction. —*The Journal of Experimental Medicine*, October 1, 1924.

BIOLOGICAL reactions to Roentgen rays exhibit, in general, fairly wide variations even under conditions which are assumed to remain constant.

Skin reactions offer obvious advantages for experimental study of Roentgen ray effects since they may be followed in the living animal over long periods, and in particular, the alopecia reaction commends itself because it is so readily recognised. The authors are making a series of experiments on small animals in order to determine, if possible, the degree of normal biological variation to be expected in this particular reaction, under minimum radiation, after uncertainties of dosage have been eliminated in so far as is possible. This paper presents in some detail the study of a single series of fourteen rabbits treated on the abdomen with soft rays—the only series which has been under observation for a length of time sufficient to justify a statement of the results. The animals were carefully selected for reasonable uniformity of weight, absence of pigmentation on the abdomen, general health, and particularly for freedom from nose disease.

PREPARATION AND EXPOSURE OF THE ANIMALS.

The treatments were given through apertures in a shield of lead-filled sheet rubber. This shield, 40 cm. square, is 1·5 mm. thick except in the middle, where a rectangular portion 15 by 18 cm. is built

up to a thickness of 3 mm. In this thick part are seven apertures—two parallel rows of three circular holes, each 1 cm. in diameter, and one elongated aperture at one end of the double row, for purposes of identification. All of the apertures lie within a rectangle 3 by 6 cm. The shield is prepared for use by coating the middle part on the under side with adhesive mixture, taken from surgeon's tape by applying the adhesive surface of the tape to the shield, dampening with xylol, and stripping off the fabric.

The animal, with abdomen shaved and washed, is placed on a board, and sandbags are arranged on either side to restrict its movements. The shield is then put in place, and the adhesive surface pressed into good contact with the skin. A frame of wires supports the free parts of the shield. With this arrangement, only a small part of the weight of the shield rests on the animal, and the apertures are maintained in a fixed relation to the skin during treatment. When the shield has been put in place, a lead-covered board, with aperture 12 by 15 cm., is placed over all, and supported at a fixed height above the first board on four pillars. The animal is adjusted vertically, until the surface of the abdomen is exactly flush with the lower surface of this board, in order to define the target distance.

Before treatment, each of the apertures of the shield save one, the large one, is covered with a little piece of leaded rubber. The lengths of exposure of the various areas are controlled by removing these patches, in a definite order, at proper intervals. After the treatment, the adhesive is removed from the skin with ether and alcohol.

Ionisation Measurements.

Ionisation measurements were made at intervals with apparatus previously described.* The small chamber (about 5 mm. in diameter), half imbedded in the surface of a wax phantom, which is used in place of the animals, is carefully adjusted to the skin-target distance. Two pieces of sheet lead laid on the wax, one on either side of the chamber, with their straight edges parallel to the chamber and equidistant from it, serve to define the width of the exposed portion of wax. In measurements made to follow up possible gradual changes in tube efficiency, an opening of 1·25 cm. was used.

In order to evaluate animal dosage in terms of ionisation, it is necessary to estimate the variation of dose with aperture size caused by scattering. For this purpose, measurements were made with various widths of aperture between the lead plates. When the aperture was increased from 1·25 cm. to 3·75 cm., the ionisation rate increased

* Clark, H., *Am. Journ. Roentgenol. and Radium Therap.*, 1924; xi, 445.

by 3 per cent. It appears, therefore, that measurements made with the smaller aperture should be decreased by about 1·5 per cent. to correspond with the small apertures used with the animals. The proximity of the various rayed areas of the animal should introduce a slight scattering error. A consideration of all of the factors involved indicates, however, that it is negligible in the cases which have a bearing on the results of these experiments.

Results.

Rabbits 1 to 8 (Group A) were rayed consecutively ; that is, without allowing the plant to be used for other purposes. Likewise, the animals of Group B were rayed consecutively. In the interval between the treatments of the two groups, the machine was almost constantly in use, and the ionisation measurements indicated a consequent decrease of 3 per cent. in the soft ray efficiency. The necessary correction is embodied in the intensity factors shown at the top of the chart.

When these factors are taken into account, the discrepancy in critical dosage between the groups, amounting to about 4 per cent. on the exposure scale, is reduced to about 1 per cent. The experiments disclose, therefore, no evidence of any biological variation whatsoever. The weighted mean value of exposures, corresponding to all circles contiguous to the critical dose line on the chart, corresponds, for unit intensity factor, to an exposure of 340 seconds. The spacing of the exposures is such that this mean value may differ from the true critical exposure by about 2 per cent., which is just within the limits of accuracy assumed for the dosage.

This mean value corresponds, according to the ionisation measurements, to the production of about $2{\cdot}04 \times 10^{15}$ ions (of either sign) per gm. of tissue. The correspondence entails, however, an additional chamber calibration error of perhaps 2 per cent., and it rests on the assumption that the method of phantom measurement is valid—an assumption not entirely free from objection.

In experiments of this kind it is difficult to exclude unconscious personal bias in making diagnoses. In view of this fact, the work has been divided sharply into two parts. All treatments and ionisation measurements were made by one of us (Clark) while all diagnoses were made by the other (Sturm, kindly assisted by Dr. James B. Murphy) without knowledge of the measurements.

This paper is presented as a record of the experiment without any conclusions as to the general validity of the results. Whether, in other circumstances, the reaction would have been less consistent, and whether, in the present ones, a larger number of animals would

exhibit greater variations, are questions on which no opinion is ventured.

SUMMARY.

Seven areas on the abdomen of each of fourteen rabbits were exposed to soft Roentgen radiation of constant quality in doses varying, in the region of the value critical for the production of persistent alopecia, by regular steps of about 4 per cent. Without exception the critical dose was found to lie between two such values, the upper limit being represented by exposures on eight of the animals and the lower on ten of them. With certain reservations, the critical dose corresponds to the production of $2{\cdot}04 \times 10^{15}$ ions of either sign per gm. of tissue.

Correspondence

VACCINATION AGAINST TUBERCULOSIS.

To the Editor of the VETERINARY JOURNAL.

DEAR SIR,—

The short but interesting article by Dr. Nathan Raw tempts me to ask him to give further information.

In the work of Calmette and Guèrin it was found that vaccination with their tubercle bacillus known as B.C.G. caused the animals to react to tuberculin. I notice in Dr. Nathan Raw's article the farmer who used his vaccine says the inoculated do not react to tuberculin. Is this correct? Personally, I should expect avirulent cultures of the tubercle bacillus, if used for immunisation, to cause the inoculated to become reactors.

One gathers from Dr. Raw's article that one immunising is sufficient for life. Is this so? Calmette and Guèrin have found that it is necessary to immunise annually to keep the animals free from natural infection. Both Calmette and Guèrin, and Vallée have found that immunity lasts only so long as a nidus of tubercle bacilli remains in the inoculated animal, maintaining a kind of symbiotic existence in the system at the seat of inoculation. These French observers have all endeavoured to prolong this symbiosis by injecting their cultures with some non-absorbable material such as talcum in vaselin, etc. Has this been Dr. Raw's experience?

If Dr. Raw's vaccine is being sold, what is its cost per animal? I understand that in France Calmette and Guèrin are issuing their vaccine to veterinary surgeons without charge until such time as its efficacy is established.

I am, etc.,

S. H. GAIGER.

ANIMAL DISEASES RESEARCH ASSOCIATION,
GLASGOW,
November 12, 1924.

To the Editor of the VETERINARY JOURNAL.

SIR,—

In connection with certain research work now in progress in this Department, we are in need of pure-bred aborted horse fœtuses of all breeds. Only those of known breed, date of service, and date of abortion would be of value.

We also require skulls, or heads, of adult pure-bred horses and dogs. In this case, too, it is important to know the breed, age, and sex of the animal.

Would all breeders who can supply me with such material kindly send the specimens to me at this address ? I shall, of course, defray all expenses in connection with packing, carriage, etc.

I am, Sir,
Yours very truly,
F. A. E. CREW,
Director.

ANIMAL BREEDING RESEARCH DEPARTMENT,
HIGH SCHOOL YARDS,
THE UNIVERSITY, EDINBURGH.
November 21, 1924.

Personal

THE following notice has been issued by the National Veterinary Medical Association of Great Britain and Ireland, Limited, and we bring it to the notice of our readers in the hope that a sufficient number will attend the meeting to enable the Resolutions to be passed by a satisfactory majority.

NOTICE

NOTICE IS HEREBY GIVEN that an Extraordinary General Meeting of the above-named Association will be held at the Royal College of Veterinary Surgeons, 10, Red Lion Square, London, W.C. 1, on Monday, the 8th day of December, 1924, at Three o'clock in the afternoon, for the purpose of considering, and, if thought fit, passing the following Resolutions :—

(1) That it is desirable to reconstruct the Association, and accordingly that the Association be wound up voluntarily, and that Geoffrey Herbert Livesey, of 10, Gray's Inn Square, London, W.C. 1, be hereby appointed Liquidator for the purposes of such winding-up.

(2) That the said Liquidator be hereby authorised to consent to the registration of a new Association, to be named " The National Veterinary Medical Association of Great Britain and Ireland," with a Memorandum and Articles of Association which have already been prepared with the privity and approval of the Council of this Association.

(3) That the draft Agreement submitted to this meeting, and expressed to be made between this Association and its Liquidator of the one part and the National Veterinary Medical Association of Great Britain and Ireland of the other part, be hereby approved, and that the said Liquidator be hereby authorised, pursuant

to Section 192 of the Companies (Consolidation) Act, 1908, to enter into an Agreement with such new Association (when incorporated) in the terms of the said draft, and to carry the same into effect with such (if any) modifications as they think expedient.

Should the above Resolutions be passed by the requisite majority, they will be submitted for confirmation as Special Resolutions to a second Extraordinary General Meeting, which will be subsequently convened.

Dated the twenty-second day of November, 1924.

By order,

GEOFFREY H. LIVESEY,
General Secretary.

NEW VETERINARY CADRE.

WITH the approval of the Secretary of State for India, a new section of the Royal Army Veterinary Corps will be formed for continuous service in India. This will be a cadre of twenty-two officers, who will be permanently on the Indian establishment, and in war the cadre will expand in accordance with requirements. The rates of pay will be as for officers of the R.A.V.C. serving temporarily in India, *plus* an addition for continuous Indian service at the rate of 100 rupees for Lieutenants and Captains, 150 for Captains of fifteen years' service, and 200 for Majors. Promotion will follow R.A.V.C. procedure, and selection for Lieutenant-Colonel will be made to fill vacancies in the corps. The cadre will be filled by volunteers from the corps. Officers will be required to pass in Urdu within two years of joining the cadre. Pension rates will be as laid down for the R.A.V.C., *plus* an Indian element, and leave will be as for British officers.—*The Times.*

NOTICES

All communications should be addressed to 8 Henrietta Street, Covent Garden, London, W.C. 2. Telephone: Gerrard 4646. Telegrams: "Baillière, Rand, London."

Letters for the JOURNAL, literary contributions, reports, notices, books for review, exchanges, new instruments or materials, and all matter for publication (except advertisements) should be addressed to the Editor.

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THE SUPPLEMENT.

The attention of those who still require BINDING CASES for Sir Frederick Smith's "History of Veterinary Literature," Vol. II, is directed to page xv of the advertisements of this issue.

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Prof. W. E. Dixon, Cambridge. "The Practitioner," May, 1922, p. 313.

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"New York Medical Journal and Medical Record," April 18th, 1923.

* Now known by the convenient name Dimol.

† "The Lancet," April 9th, 1921.

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—— —— ——, F.R.C.V.S.

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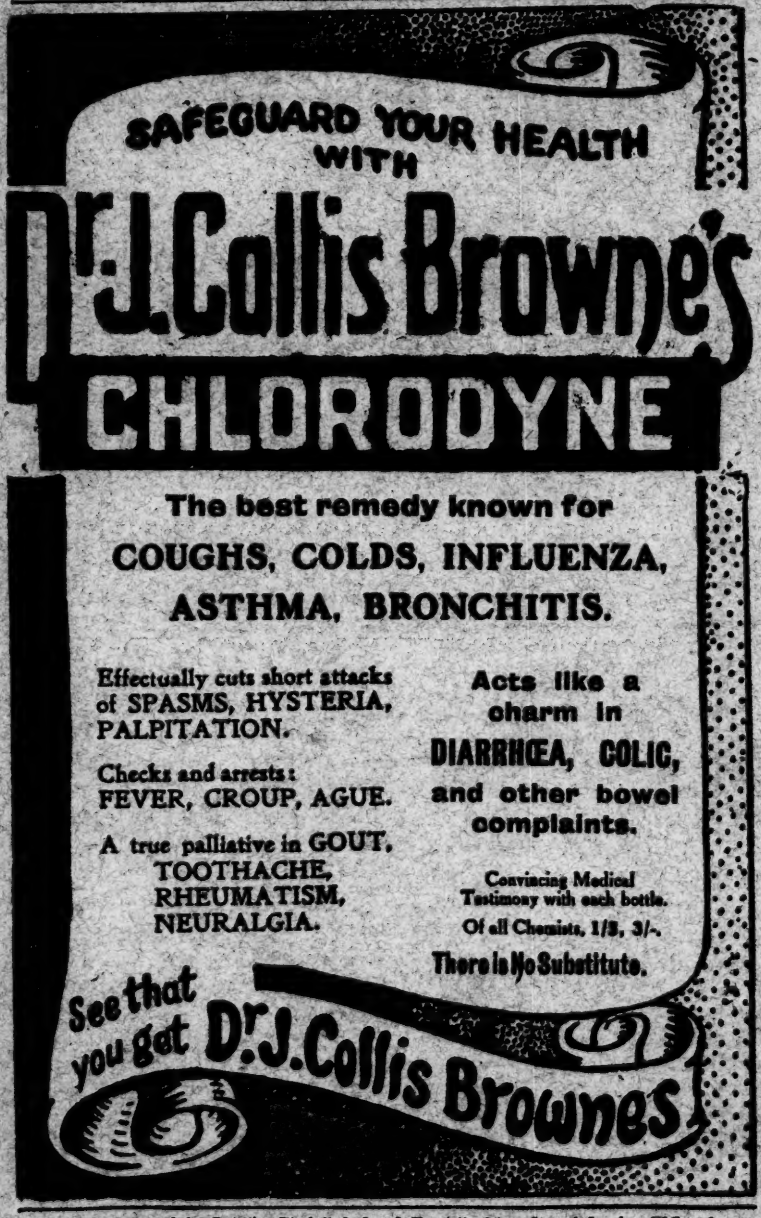
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